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| **Identifying Rules**  \*Lesson is adapted from activities in *ThinkMath!,* Harcourt School Publishers, 2008. |
| **Mathematics, Grade 1** |
| **Materials:**   * calculators |
| **TEKS/SEs:**   * 1.4 – identify, describe, and extend concrete and pictorial patterns in order to make predictions and solve problems.   **Objective 6 TEKS/SEs (Underlying Processes and Mathematical Tools):**   * 1.11A – identify the mathematics in everyday situations * 1.11B – solve problems that incorporate understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness * 1.11C – select or develop an appropriate problem-solving plan or strategy including drawing a picture, looking for a pattern, systematic guessing and checking, or acting it out in other to solve a problem * 1.11D – use tools such as real objects, manipulatives, and technology to solve problems * 1.12A – explain and record observations using objects, words, pictures, numbers, and technology * 1.12B – relate informal language to mathematical language and symbols * 1.13 – use logical reasoning; justify thinking using objects, words, pictures, numbers, and technology |
| **Lesson objective(s):**   * + Students will :     - Explore different kinds of rules that can be used with rule machines |
| **Differentiation strategies to meet diverse learner needs:**   * Problem- solving, inquiry-approach * Hands-on exploration * Collaboration and discussion |
| **ENGAGEMENT**   * Draw a rule machine on the board similar to the one shown below. Review with students how a rule machine works.   + *You put something into the machine. The machine applies a rule and something comes out the machine.* * Pass out calculators. Ask volunteers to explain how a calculator is like the rule machine. |
| **EXPLORATION**  **Part 1**:   * Begin an input/output table on the board. * Tell children to use the rule, *add 19*, and write this rule on the rule machine. * Ask someone to suggest an input, write it in the table and have students use their calculators to find the output. * After repeating this procedure for four or five suggested inputs, write an output such as 38 in the table and ask students to find the input.  |  |  |  |  |  | | --- | --- | --- | --- | --- | | In | 10 | 2 | 5 |  | | Out | 29 | 21 | 24 | 38 |   **SUGGESTIONS**   * *How can you use the calculator to find the input if you know the output and the rule?* * *When and why does subtracting 19 work?* * *Do you see any interesting patterns in the table?* |
| **EXPLANATION**   * Students will explain their thinking and justify their solutions in groups and in whole-class discussion, as well as with drawings, diagrams, and oral explanations. |
| **ELABORATION**   * Sketch an input-output table like the one below and ask students to use their calculators to help find the rule. Have volunteers explain their strategies and justify their rule.  |  |  |  |  |  | | --- | --- | --- | --- | --- | | In | 304 | 262 | 487 |  | | Out | 429 | 387 |  | 146 |  * Use the rule machine for something other than numbers:  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | In | G | R | X | J | K | Q | X | W | | Out | D | O | U | G | H | N | U | T | |
| **EVALUATION**   * + Create an input/output table and let students come up with their own rule and work with a partner to solve each other’s rules. |